PB-218 517

SYMPOSIUM OF RESEARCH ON PROBLEMS RELATING TO WATER POLLUTION IN THE PACIFIC NORTHWEST (1ST)

Public Health Service
Portland, Oregon

7 November 1957

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First Symposium of Research on Problems Relating to Water Pollution in the Pacific Northwest

Room 104, U. S. Court House
Broadway and Main
Portland, Oregon
November 7, 1957

AGENDA

9:30 to 10:00 I. Introductions

Each person present will introduce himself, indicate his connections and make a brief statement regarding the field of research in which he is primarily interested.

10:00 to 10:15 II. The purpose of the symposium.

III. Discussions of the following fields of research in light of:

What type of research is considered most important.

What are some of the problems.

What projects are presently underway and what are their objectives.

What tools are used.

What are the needs of the researcher.

How can they be supplied.

10:15 to 11:30 1. Aquatic research, leader, Dr. R. E. Dimick.

11:30 to 12:00
1:30 to 2:15 2. Industrial waste research, leader, Mr. Vinton Bacon.

2:15 to 3:30 3. Oceanography and salt water research, leader, Dr. Clifford Barnes.

3:30 to 4:15 IV. Analysis of Pacific Northwest pollution problems in the light of research needs, leader, E. F. Eldridge.

4:15 V. Suggestions for the future, leader, Mr. Robert Sylvester.

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SYMPOSIUM ON RESEARCH RELATING TO WATER POLLUTION

List of those attending:

Dr. Herman Amber, Crown Zellerbach, Camas
Mr. Vinton Bacon, Pacific Northwest Pulp and Paper Assn., Tacoma
Dr. Clifford A. Barnes, Dept. of Oceanography, Univ. of Wash., Seattle
Mr. Wilson Bow, State Dept. of Health, Seattle
Mr. Herbert C. Clare, U. S. Public Health Service, Portland
Mr. J. J. Davis, Atomic Energy Commission, Hanford
Dr. R. E. Dimick, Fish & Wildlife Mgt., Oregon State College, Corvallis
Dr. Peter Doudoroff, U.S.P.H.S., Oregon State College, Corvallis
Professor Gilbert Dunstan, Dept. of Civil Engin., Wash. State Coll., Pullman
Mr. E. F. Eldridge, U. S. Public Health Service, Portland
Dr. R. F. Foster, Atomic Energy Commission, Hanford
Dr. Isaiah Gellman, National Council for Stream Improvement, Portland
Mr. E. P. Haydu, Weyerhauser Timber Company, Longview
Mr. Frank Hawks, Asst. Res. Mgr., Rayonier Inc., Shelton
Mr. Gilbert Holland, Washington Dept. of Fisheries, Seattle
Mr. Donald Johnson, Washington Dept. of Fisheries, Seattle
Dr. Max Katz, U.S.P.H.S., Oregon State College, Corvallis
Dr. Wm. L. Lehman, Reed College, Portland
Mr. Cedric Lindsey, Washington Dept. of Fisheries, Seattle
Mr. L. D. Marriage, Water Resource Analyst, Oregon Fish Comm., Portland
Mr. W. Bruce McAlister, Oregon State College, Corvallis
Mr. Alfred T. Neale, Washington Pollution Control Commission, Olympia
Dr. Erling J. Ordal, Health Science Dept., University of Wash., Seattle
Mr. Chester Peck, Oregon State College, Corvallis
Dr. L. Edward Perry, U. S. Fish & Wildlife Service, Portland
Dr. Harry K. Phinney, Dept. of Botony, Oregon State College, Corvallis
Professor M. Popovich, Engr. Expt. Station, Oregon State College, Corvallis
Dr. Maurice Raffray, Dept. of Oceanography, Univ. of Wash., Seattle
Dr. Arthur F. Scott, Reed College, Portland
Mr. Kenneth H. Spies, Oregon State Sanitary Authority, Portland
Dr. Jerry Stein, Research Consultant, Rayonier Inc., Shelton
Mr. Jerome H. Svore, U. S. Public Health Service, Portland
Professor Robert Sylvester, Dept. of Civil Engin., Univ. of Wash., Seattle
Dr. John Thorpe, Reed College, Portland
Dr. Charles E. Warren, Fish & Wildlife Mgt., Oregon State Coll., Corvallis
Professor Warren Westgarth, Engr. Expt. Station, Oregon State Coll., Corvallis
Mr. S. J. Westrheim, Aquatic Biologist, Oregon Fish Comm., Portland
Mr. John Wilson, U. S. Public Health Service, Portland

Report in Brief on "First Symposium of Research on Problems Relating to Water Pollution in the Pacific Northwest"

The first symposium on research on problems relating to water pollution was held in Room 104, U. S. Court House, Portland, Oregon, on November 7, 1957. Arrangements for this symposium were made by Edward F. Eldridge, Technical and Research Consultant, U. S. Public Health Service, Portland, Oregon.

Attached is a list of those who attended the meeting, together with their connections and addresses.

Enclosed herewith is the agenda for this meeting.

The meeting was opened by Edward F. Eldridge. Herbert C. Clare said a few words of welcome and indicated support by the Public Health Service to those engaged in research on water pollution problems.

Mr. Eldridge stated that he hoped this would be known as the first symposium on water pollution research and that others would follow. He indicated that, although he as a representative of the Public Health Service had arranged for the meeting, it was by no means to be considered a Public Health Service symposium. The meeting belonged to those in attendance. Since one of the purposes of the meeting was to become acquainted, the first item on the agenda provided that each individual give his name and connection and a brief statement of his interests in water pollution research.

The main objective of the symposium was to further and make more objective the research on problems relating to water pollution. There was a great deal of competence represented by the people attending the meeting. This competence used individually is of considerable value. However, if it could be collectively applied, the individual abilities would be multiplied several times. Of course, it is not possible for all those present to collectively place their efforts on all or perhaps even on any one of the research problems undertaken in the area. By necessity each must work with his own group and largely individually. However, it is possible by becoming sufficiently well acquainted with each other's respective fields of abilities and interests to draw on these abilities as they are needed for certain specific projects.

Research in water pollution requires specific knowledge in many fields. Any one problem might involve several of these fields. For instance, the problem might be a study of the effects of industrial wastes on aquatic life. To cover the field of this problem requires knowledge in biology, perhaps both salt and fresh water, a special knowledge of fisheries and fish pathology, familiarity with the industrial process and the nature of the wastes, chemistry to develop special test procedures and engineering for hydraulics and other aspects. No one person can hope to be competent in all of these fields. Normally it is not possible to hire people with competence to cover all of them. The result may be that certain important phases of the work are questioned. This may disqualify the entire project. This is not pure specu-

lation. It does happen and too often.

Most of these fields were covered in the group assembled. How can they best help each other? Certainly it is necessary first to get acquainted. Perhaps each began to see as the meeting progressed how he could improve his own research through this acquaintance.

The agenda was divided into the discussion of three general subjects, namely, aquatic research, industrial waste research, and oceanographic and salt water research. These discussions were lead respectively by: Dr. R. E. Dimick, Mr. Vinton Bacon, and Dr. Clifford Barnes. No attempt will be made in this abstract of the meeting to indicate the person responsible for the statements recorded below.

Aquatic Research

The discussion on aquatic research was lively and informative. It became apparent as the meeting proceeded that the biological phases of the pollution problem were given a high priority by the persons present. The following are some of the statements made during the discussion of this portion of the meeting.

There is a great need for exchange of ideas and experiences.

Biology should be approached rationally and critism accepted freely.

Each biologist has a particular speciality which, in many cases, he may feel is an answer to the means of measuring pollution biologically.

There is a need for a thorough knowledge of the animals studied. Bioassays in the past have not taken this into full account.

More emphasis should be placed on biological standards, since to date too much reliance has been placed on chemical and physical methods.

One of the primary needs is an adequate physiological and ecological knowledge of the character of the organisms. This is especially true of the oysters.

It is not possible to develop one organism as an indicator. We are not going to be able to tell what happens to the oyster population by studying diatoms. A study of mortalities and a study of diatoms and other food organisms are not the complete answer to many of the problems. In attempting to study the indices of pollution many researchers have forgotten the end product, the fish.

There apparently is no means for measuring the general productivity in a stream. The question was asked, "Would a study of the fish itself be a means of measuring general productivity?"

In developing indicator organisms it is necessary first to know the area of study. There undoubtedly would be a "best" indicator organism for each area of a stream.

Assessing the productivity of fish populations is primarily the responsibility of fisheries agencies.

There is a great deal of biological and basic work to be done. The biologists alone cannot accomplish this job - neither can industries or other agencies involved in pollution control.

The bio-assay as developed by the Public Health Service and now in use in many places was discussed to some length. It was indicated that the methods for bio-assay had been fairly well established. It provides a short-term method of measurement.

The problem now is the application of bio-assay results. The results of bio-assay indicate the quantity of material necessary for a 50 percent kill of the test organisms. This obviously is not desirable, therefore it is necessary to apply some safety or application factor to the results. A general application factor may not be realistic since the factors should be adapted to the stream in question. In order to study application factors, it is necessary to first apply the bio-assay to some test stream and later, on a practical basis, to an existing condition.

Short-term bio-assay is not pertinent to long-time effects. It is useful in comparing the comparable strength of wastes.

There is no substitute for long-term bio-assay. The same is true of the short-term study since each serves a definite purpose.

Too many investigators have been satisfied in following in the steps of the biologists.

Bio-assay is intended as an engineering tool, something like the B.O.D. tests.

It is not desirable to rely on literature or on other people's work regarding indices of biological pollution.

Biological results to date, especially as related to the toxicity of industrial effluents, have been too specific as regards test animals and other test conditions.

Considerable work is yet necessary before biological criteria or indices can be developed. It may be a long time before biological standards and criteria can be reliably applied. In the meantime, however, it is necessary to establish some type of standard or criteria by which control agencies and industries can proceed on a reasonable and adequate pollution control program.

It was the concensus of those present that there is a considerable need for research on the matter of biological indices and criteria and that the knowledge to date is not sufficient for this purpose. The desire of industry to have some short easy method of measuring the effects of their wastes on streams may never be attained. A great deal of basic information on the general productivity of waterways is necessary before reasonable and adequate indices are possible. Industry should lend their support to the collection of this basic information.

Industrial Waste Research

Research is a tool by which we work.

As regards pollution control there are several philosophies. One philosophy is that there shall be no change in water environment, that it shall be left as it is. The other philosophy is that the entire water resource should be used for disposing of wastes. Obviously neither philosophy is realistic.

There is need for applying research to the receiving stream by first collecting background data. Basic data information is necessary to determine the variations in natural environment. Whether or not this can be called research is a question which was not decided in this meeting.

Research is necessary in fresh water, salt water, and in the combination of fresh and salt water such as found in river estuaries.

There seemed to be some indication that research to date had fallen short of satisfying the needs of the problem.

The control agencies, especially those in Oregon, do not specify the methods of waste disposal but leave this matter to the industries and cities.

The agencies are interested in the development of standards for wastes discharged to streams. The primary objective is protecting the aquatic environment. Effluents should be controlled so that they do not go beyond the limits established.

Reference was made to the slime problem in the Columbia River and its tributaries. There is a need for more information by which to predict the conditions likely to produce slimes and the effects of the slimes on the aquatic environment.

Another problem requiring study is that of turbidity resulting from watershed practices. There is a need for a turbidity standard.

There is also a need for more information on dissolved oxygen standards.

The general standard of 5 ppm of dissolved oxygen for all streams and waterways is not realistic.

Pollution control regulatory agencies in Washington are interested in the relation of wastes to aquatic life.

Research results should be applied to the receiving stream.

There is a need for determining water quality characteristics of waterways before new industries start operation. Some appropriate background data is extremely important in these cases.

The regulatory agency needs to know the productivity of a stream and must have some type of indicator to determine whether or not this productivity is affected by pollution.

A statement was made that return flows from irrigation projects may, in some cases, be of more significance than the pollution from industries and cities. Very little seemed to be known about irrigation return flows in connection with pollution of waterways.

The oyster problem in the State of Washington was discussed in connection with the research work now underway by the Department of Fisheries and the Department of Oceanography, University of Washington. The question to be answered is largely, "Is sulfite waste liquor toxic and, if so, how much?"

The wastes from canneries in Eastern Washington were discussed as they relate to the slime problem and to the disposal by irrigation. Preliminary work is underway to determine what organisms are involved in the slime problem.

Lagoons for cannery wastes are under study.

The effect of irrigation return flows on the slime problem was discussed to some extent. This appears to be a problem of nutrients, especially phosphates.

It was suggested that the basis of the pollution control program must start in the lower reaches of the rivers since the quality in these areas govern the type and degree of treatment of wastes in the areas upstream.

It is of primary importance to know first the water quality needed in order to establish a reasonable and adequate pollution control program.

There was general agreement that a planned water management program is needed for the future.

Bacterial fermentation of spent sulfite liquors was discussed.

Oceanography and Salt Water Research

There is a need for more knowledge of marine environment. This knowledge should be basic. It is the hardest to get because it has no sponsors.

The results of basic research cannot be guaranteed. Neither can this information be established within time limits.

Practical decisions can only be made insofar as basic knowledge is available.

We must start now on work on a broad background of research.

Basic research is fundamental.

Biological, physiological, meteorological, and chemical conditions or factors occuring in the sea are many times greater than those of fresh water. Fresh water techniques cannot always be used. There is a complexity of current systems influenced by many factors. In order to make these determinations it is necessary to go out to sea and measure them. It will be a long time before we can accurately predict the effects of the discharge of wastes into the sea. The sea must be considered as a sump which is the final receptacle for all waste material.

We do not presently have an accurate knowledge of marine environment. There is a definite need for this basic knowledge and for the factors which influence the various biological processes in salt water. We look to the universities largely to provide this information.

It is up to the biologist and the oceanographer to obtain the background information. The problem will then be applied by the engineer.

Indicators are also necessary for the marine environment.

In most cases there is no history of estuary conditions.

In many cases we may have already passed the normal requirements of some organisms. For instance, it takes a "fantastically" small amount of certain metals to effect normal life since marine organisms are very sensitive to such metals. About the only way to determine these effects is to go to areas which have not been developed and determine the conditions in those areas as compared to the areas where pollution and other factors are causing a depletion of aquatic environment.

It is necessary to find out how nature is operating and to make use of it to minimize the effects of pollution. Use should be made as far as possible of natural factors. The type and degree of treatment is dependent on the specific waters into which a waste is discharged. We must know the disposition of these materials in the waterway. Are they destroyed or are they flushed out.

Analysis of Pacific Northwest Pollution Problems in Light of Research Needs

Mr. Eldridge explained how with the help of the two regulatory agencies in Washington and Oregon an analysis was made of the major pollution problems in various areas in the two states. From this analysis the type of information necessary for a solution of the specific pollution problems was determined. A summary of this analysis, together with a general statement of the needed pollution research, was distributed to those attending the meeting.

Suggestions for the Future

Mr. Robert R. Sylvester summed up the results of the meeting and indicated some of the needs for the future as follows:

As this country developes there will be more and more demand for water.

Our streams are being turned into a series of lakes by the construction of dams for flood control, reclamation and power. How will these dams change the biology of the river?

Pollutants have been quite simple in years past. Now, because of the developments especially in the chemical industry, these pollutants are becoming more and more complex.

There is more and more pressure being applied for recreation and recreational areas.

It will be necessary to find uses for waste materials in order to supplement resource material which will gradually diminish.

It is necessary to determine the assimilative quality of water. This is desirable and necessary in establishing water quality criteria. New yardsticks must be developed for measuring water quality. These may be largely biological.

Monitoring will become an enormous task as more and more wastes are discharged under controlled conditions. Tests to be used in monitoring must be developed. New and refined analytical tests are necessary.

The effects of dams on temperature and the effect of temperature on aquatic environment are important problems.

There is need for means to measure water movements more readily. Perhaps the use of radiological methods will be developed in the future.

A growing problem is that of toxic sprays in agricultural areas. The question is how much of this gets into the water and, if so, how toxic is it.

There is a controversy regarding the use of watersheds for controlled recreation.

Are virus diseases carried by water.

What is the effect of siltation and turbidity on fish.

The above are a few of the major problems on which future research must be developed. The controlling factor in all cases is that of money. How can the research that is so badly needed be financed?

It was agreed by those present that there was competence available in most of the area to carry out the necessary research. The inhibiting factor in every case is that of money. It was suggested, therefore, that the next meeting of the Symposium group would have as its theme the financing of research projects. It was suggested that representatives from various agencies having funds available for grants to research projects be invited to attend the meeting and discuss the type of grants available, the procedure necessary in making application for a grant and other pertinent information regarding financing. It is hoped that this meeting will be held early in January.

The concensus of the meeting was that it was very worthwhile and that it should be held at intervals, perhaps once every 6 months. The Symposium should not be concerned with a discussion of the results of research since there are many other meetings where such results are presented and discussed. <u>This Symposium should be largely designed to help the researcher in his research program</u>.

As an example of how the latter can be accomplished is a suggestion made by Dr. Scott of Reed College. Dr. Scott indicated that he had been approaced by several members of the Symposium regarding the matter of radiological methods as adapted to measuring pollution control effects. Dr. Scott indicated that he would be willing to develop for a limited number of persons a discussion of radiological isotopes as they might be applied to the pollution problem. The membership of the Symposium will be canvassed at a later date to determine the extent of the interest in such a discussion